Bacteria TMDL Development for the Banister River Basin

Local Steering Committee Meeting # 1

Mary Bethune Office Complex

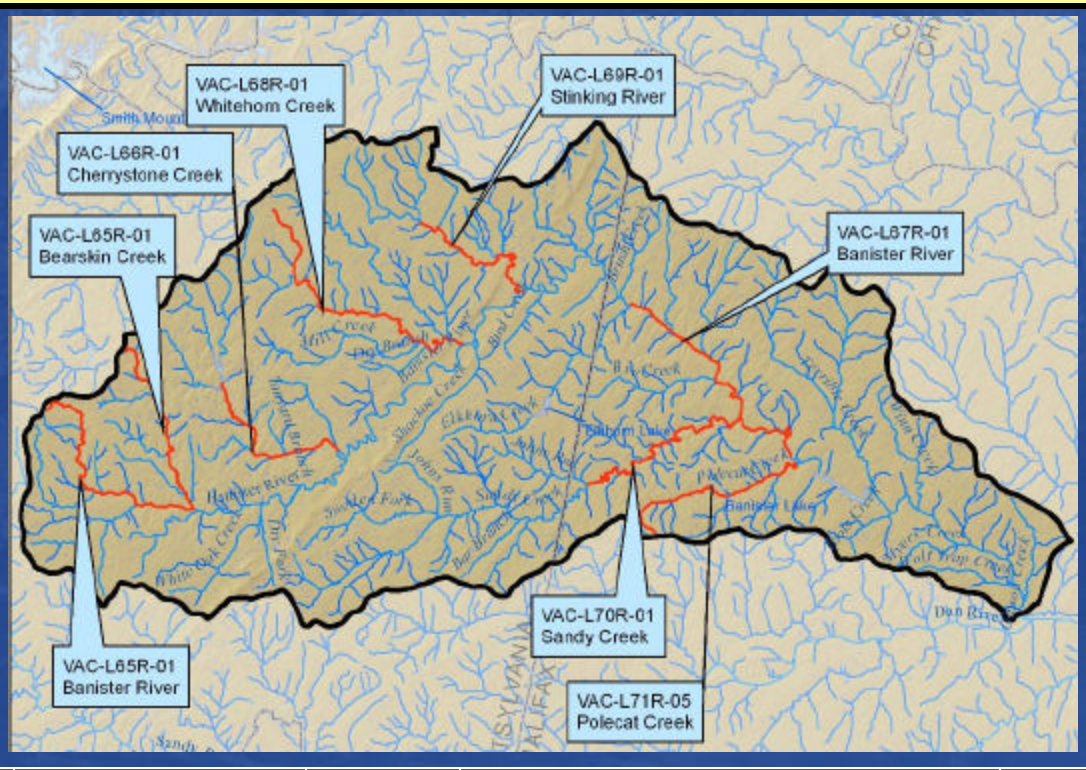
Halifax, VA

January 25, 2007

Objective:

- To present and review the steps and the data used in the development of bacteria TMDLs for listed segments in the Banister River Basin.

Bacteria Impairments

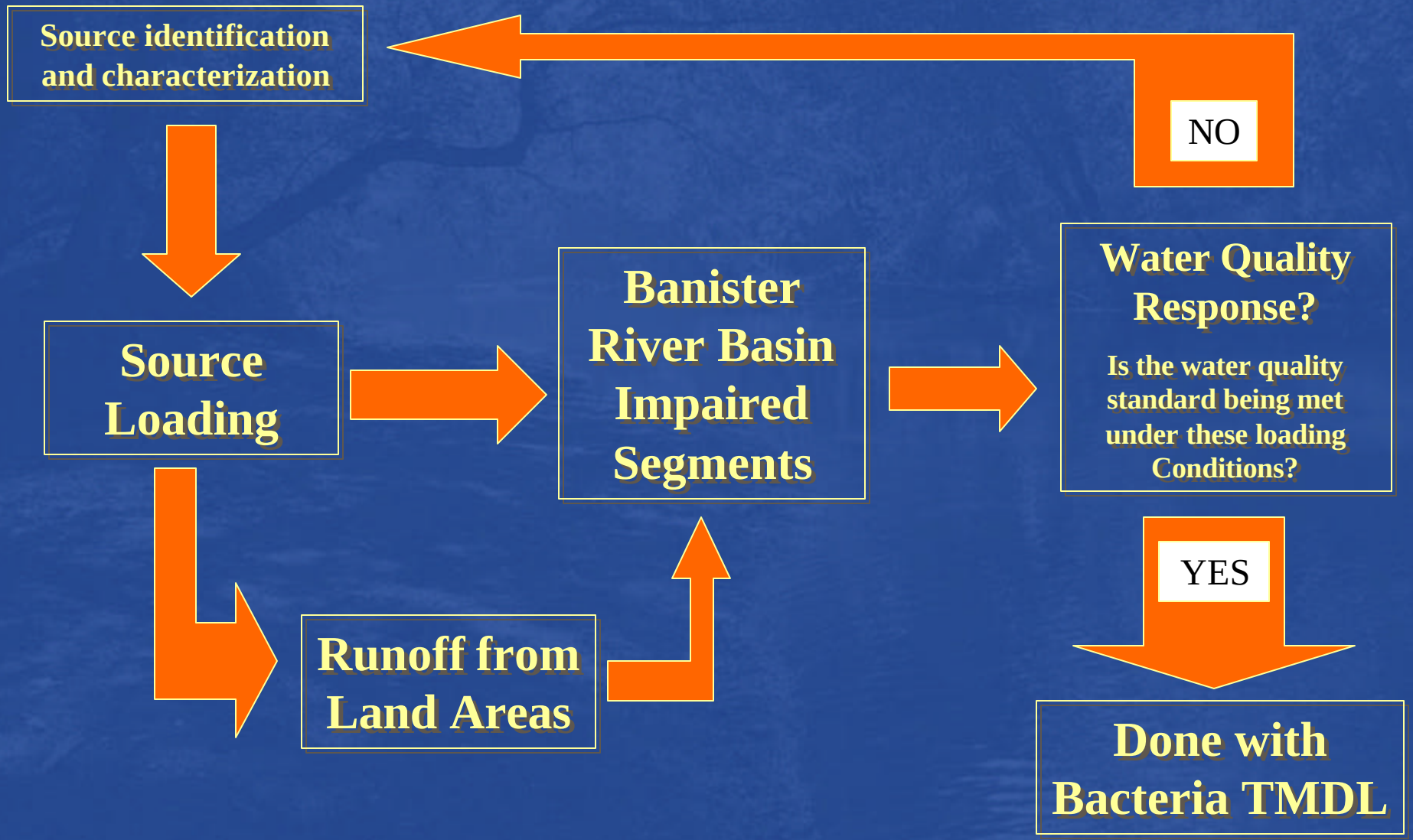


TMDL ID	Stream Name	Miles	Impairment for	Violation Rate
VAC-L65R-01	Banister River	11.67	Total Fecal Coliform	2/18
VAC-L67R-01	Banister River	13.18	E. Coli	4/16
VAC-L65R-02	Bearskin Creek	9.31	E. coli	2/7
VAC-L66R-01	Cherrystone Creek	8.44	Total Fecal Coliform	1/8
VAC-L71R-05	Polecat Creek	9.66	Total Fecal Coliform	3/13
VAC-L70R-01	Sandy Creek	11.78	Total Fecal Coliform	3/19
VAC-L69R-01	Stinking River	8.99	Total Fecal Coliform	3/20
VAC-L68R-01	Whitehorn Creek	24.73	E. coli (2006), Total Fecal Coliform (2002)	E. coli - 2/8 Fecal Coliform 1/8

Bacteria Water Quality Standards

- Bacteria Impairment: the Primary Contact Recreation designated use is not met due to exceedances of the water quality criterion for bacteria
- A segment is listed as impaired if more than 10% of samples exceed the criteria
- As of January 15, 2003, E. coli is used as the indicator species instead of Fecal Coliform
- Virginia and EPA have agreed on a translator for TMDL model development

Bacteria TMDL Development



Water Quality Model

Hydrologic Simulation Program Fortran (HSPF)

- Hydrologic Model
- Watershed Model
- State of the art Modeling System
- EPA approved approach

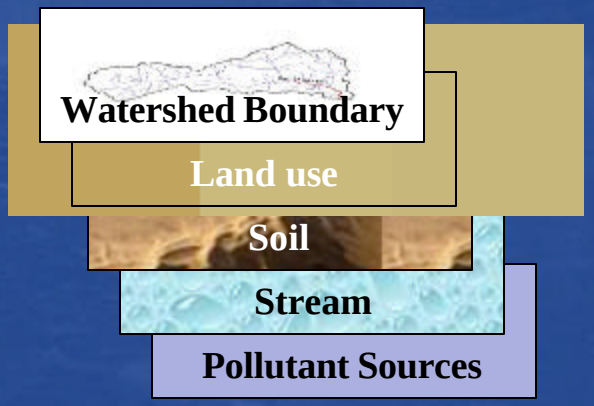
HSPF Model

Linking Sources to Water Quality

Input → **Model** → **Output**

Factors:

- Rainfall events
- Fecal coliform build up
- Fecal coliform wash off
- Fecal coliform die off rates



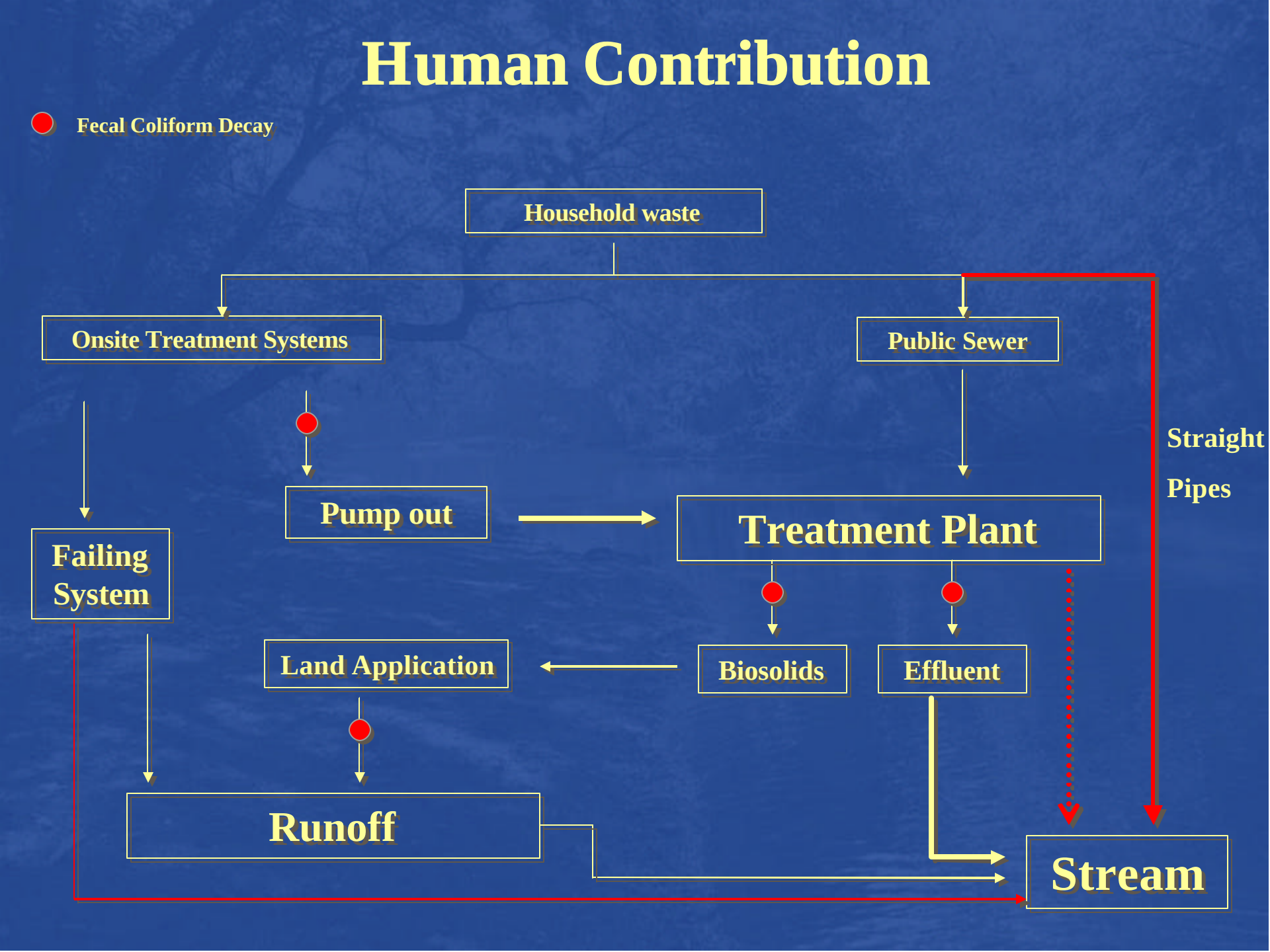
Banister River Response

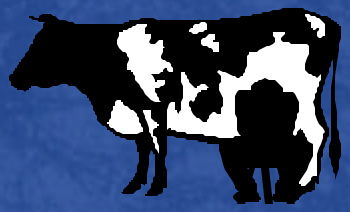
Bacteria Sources Assessment

Addresses the following issues related to bacteria production:

- **Bacteria loading from Human Sources**
  - Straight pipes
  - Septic systems
  - Biosolids
- **Bacteria loading from Livestock**
  - Livestock inventory
  - Livestock grazing and stream access
  - Confined animal facilities
  - Manure management
- **Bacteria loading from Wildlife**
  - Wildlife Inventories
- **Bacteria loading from Pets**
  - Pet Inventories
- **Best management practices (BMPs)**

Human Contribution




Livestock

Pasture

Confinement

Manure Storage

Manure Spreading

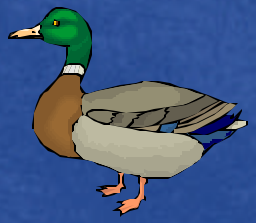
Pasture

Cropland

Runoff

Stream

Fecal Coliform Decay



Wildlife

Pasture

Cropland

Forest

Built-up area

Runoff

Stream

Fecal Coliform Decay

Pets: Dogs & Cats

Pasture

Cropland

Forest

Built-up area

Runoff

Stream

Fecal Coliform Decay

Source Loading Estimates

- **Determine the daily fecal coliform production by source**
- **Estimate the size/number of each source**
- **Determine whether the source is**
  - Direct Source
  - Indirect Source
- **Calculate the load to each land use based on a monthly schedule and for each source**
- **The sum of all the individual sources is the total load**
- **Source loading estimates used in HSPF model to simulate in-stream bacteria concentrations**

Data Needs

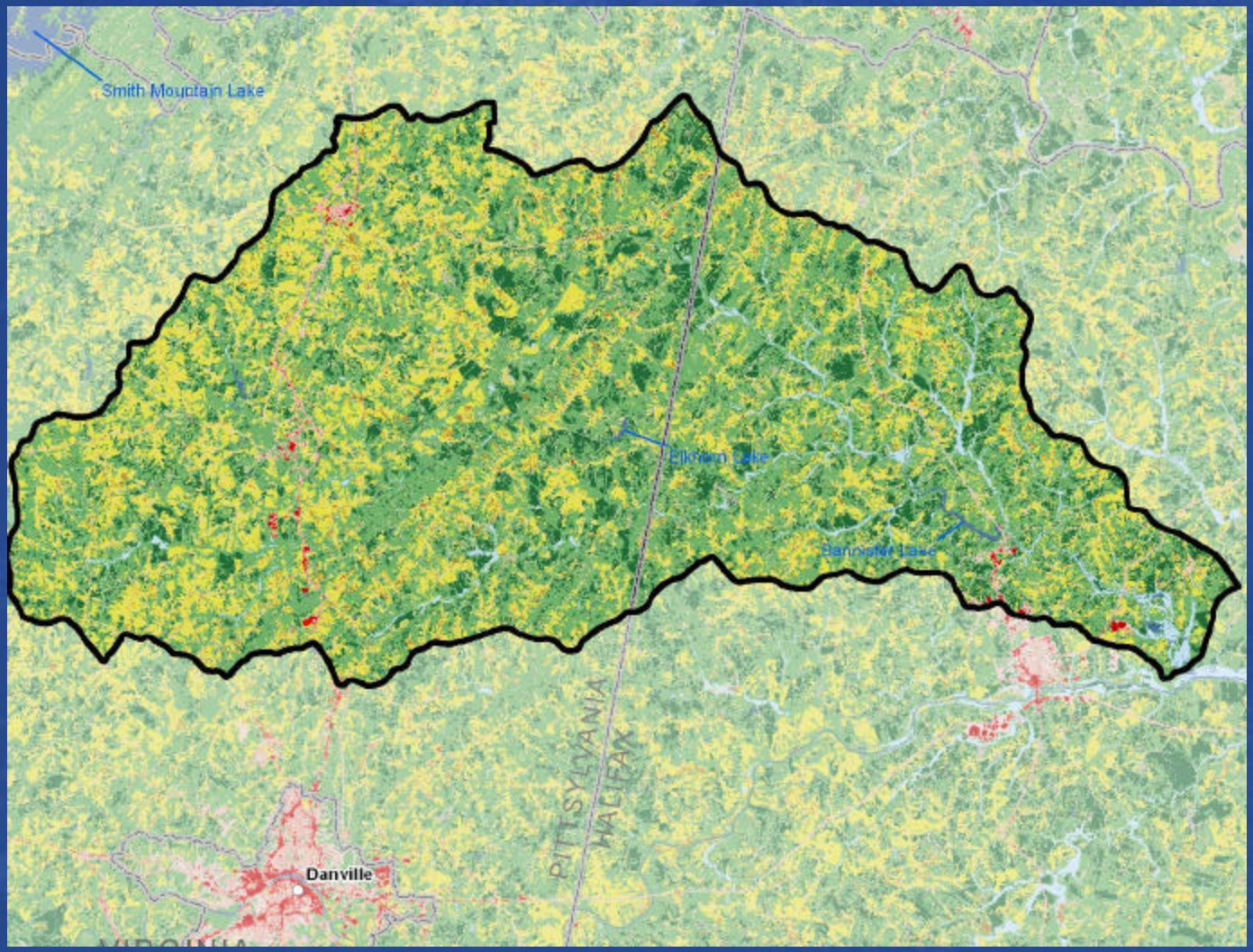
Data and Information Needs:

- Watershed physiographic data
- Hydrographic data
- Weather data
- Point sources and direct discharge data and information
- Environmental monitoring data
- Stream flow data
- Bacteria sources assessment data

Watershed physiographic data:

Type of Information	Data Source	Obtained	Processed/ Analyzed	Notes
Stream network	***Reach File Version 3 (US EPA BASINS) National Hydrography Data (USGS)***	**Yes**	**Yes**	
Land Use/ Land Cover data	***National Land Cover Data (NLCD) 2001***	**Yes**	**Yes**	
Soils	***USDA State Soil Geographic Database (STATSGO)***	**Yes**	**Yes**	
Digital Elevation Model (DEM)	***BASINS***	**Yes**	**Yes**	**10-meter DEM resolution**

Banister River Watershed Land Use



Dominate Land Use Types:

Forest: 40%

Agricultural: 25%

Bacteria Sources Assessment data:

Type of Information	Data Source	Obtained	Processed/ Analyzed
Population/ Household/ Septic System Estimates	*U.S. Census Bureau*	Yes	Yes
Livestock estimates/ agricultural practices	*USDA National Agricultural Statistics Service* *Soil and Water Conservation Districts* *Virginia Department of Health*	In Progress	In Progress
Wildlife estimates	*Virginia Department of Game and Inland Fisheries*	Yes	Yes
Pet Estimates	*U.S. Census Bureau* *National pet estimates per household*	Yes	Yes
Active and historical industrial site locations	*Virginia Department of Environmental Quality* *Local agencies and stakeholders*	Yes	Yes

Population Estimates and Sewage Disposal

Based on 2000 United States Census Data:

- **Population in the watershed is approximately 24,910 people**
- **There are approximately 10,030 households within the watershed**
- **Approximately 7,950 households in the watershed are on septic systems**
- **Assuming a septic system failure rate of 3%, 240 septic systems may be failing.**
- **Failed septic systems are considered straight pipes if located within 200 feet of a stream and are assumed to be directly discharging sewage into the stream**
- **Septic system design flow is 75 gal per person per day**

Livestock Estimates

Livestock Estimates	Halifax	Pittsylvania	Total
Cattle and calves inventory	3,956	17,962	21,918
Beef cows	2,380	8,504	10,884
Milk cows	44	1,392	1,436
Cattle and calves sold	1,904	15,771	17,675
Hogs and pigs inventory	2,728	1,526	4,254
Sheep and lambs inventory	23	116	139
Chickens	2,0000	0	20,000
Horses and ponies, inventory	199	869	1,068

Livestock numbers are based on the 2002 US Agricultural Census data, the chicken numbers are based on permit information provided by VADEQ, and the horse numbers were based on the 2001 VA Agricultural Statistics Equine report.

Wildlife Estimates

Wildlife Animal	Halifax	Pittsylvania	Total
Deer	5,092	11,500	16,591
Raccoon	2,640	5,654	8,294
Muskrat	11,407	24,435	35,842
Beaver	1,244	2,666	3,910
Goose	101	329	430
Mallard	8	18	26
Wood duck	7	16	23
Wild Turkey	1,030	2,292	3,322

Estimates are based on NLCD 2001 land use data and distribution estimates from DGIF

Pet Estimates

Pet inventories based on:

- 0.543 Dogs per household*
- 0.598 Cats per household*

In the Banister River Watershed there are approximately:

- 5,447 Dogs
- 5,998 Cats

*Source: American Veterinary Medical Association (AVMA) estimates

Banister River Point Source Inventory

(VA Department of Environmental Quality)

Category	Permit Type	Count (Active or Application)
VPDES	Industrial	1
	Municipal	10
General Permits	Single Family Domestic Sewage	9
	VPA*	9
	Poultry	1
Total		30

*Permits are issued for animal feeding operations with 300 or more animal units

Next Steps

- **Collecting additional available data**
- **Analyzing data to investigate the bacteria impairments in the watershed**
- **Developing:**
  - bacteria source loading estimates
  - modeling input parameters:
    - Hydrology and water quality
  - TMDL scenarios
- **Submitting Draft TMDL Report**

Local TMDL Contacts

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Reports/presentations available at:
www.deq.virginia.gov/tmdl/mtgppt.html

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